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IMMUNOLOGY AND INFLAMMATION

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Immunology and Inflammation

The immune system is a complex network of structures and processes whose primary function is to recognize and eliminate antigenic foreign substances, thereby protecting the body from harm. Its core feature is that immune cells and non-immune cells activated by antigens work through various biological processes, including cytokine mediation and signal transduction, to eliminate pathogens and promote tissue repair. The entire response process involves multiple signaling pathways.

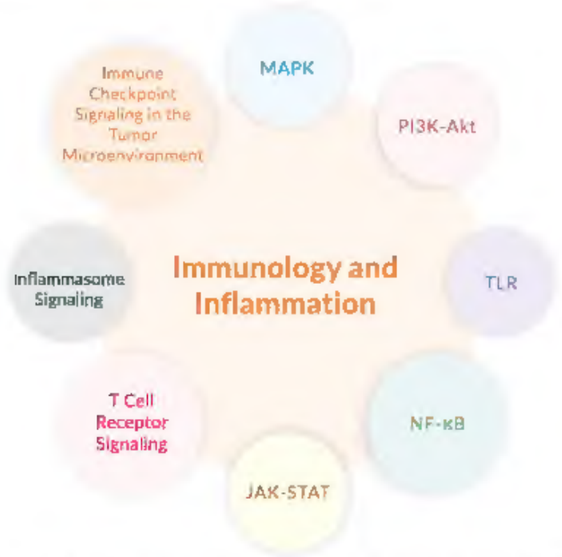


Fig. 1 Signaling pathways related to immunity and inflammation[1]

Application

- **NF-κB** is a key transcription factor involved in regulating immune and inflammatory responses. It is commonly used to study inflammatory diseases (such as rheumatoid arthritis and inflammatory bowel disease), cancer, autoimmune diseases, and more.
- **TLR** (Toll-like Receptors) is involved in regulating the production of inflammatory mediators and the activation of immune cells. It is widely used in research on infectious diseases, autoimmune diseases, immune response mechanisms, and mechanisms of anti-infective therapies.
- **MAPK** (Mitogen-Activated Protein Kinase) plays a significant role in tumor cell growth, proliferation, metastasis, and drug resistance. It is frequently used in the study of cancer, inflammatory diseases, such as rheumatoid arthritis and inflammatory bowel disease.
- **PI3K-Akt** is crucial for cell survival, proliferation, and immune regulation, and it also plays a role in controlling inflammatory responses. This pathway is extensively studied in cancer research, diabetes, cardiovascular diseases, and neurodegenerative diseases.
- **JAK** (Janus Kinase) is a common signaling pathway for many cytokines, including several immune-regulating factors like interleukins and interferons. It is commonly used in research related to inflammatory diseases, cancer, and certain immunodeficiency disorders.
- **NLRP3** inflammasome is an important signaling pathway in the innate immune system, responsible for sensing and responding to intracellular and extracellular danger signals, activating caspase-1, and initiating inflammatory responses. It plays a vital role in defending against infections, clearing damaged cells, and tissue repair.

Inflammation is a specific immune response that generally occurs in the innate immune phase; its stimuli include infection or tissue damage, which can trigger a cascade of reactions involving cytokines, chemokines, and other proteins, causing localized redness, heat, and pain.

Chronic inflammation can lead to dysregulation of innate immune responses and changes in the surrounding tissue microenvironment, thereby reducing the effectiveness of functional immune responses within the body. Many diseases are associated with chronic inflammation caused by microorganisms, autoimmunity, allergies, metabolism, physical factors, etc[2-4].

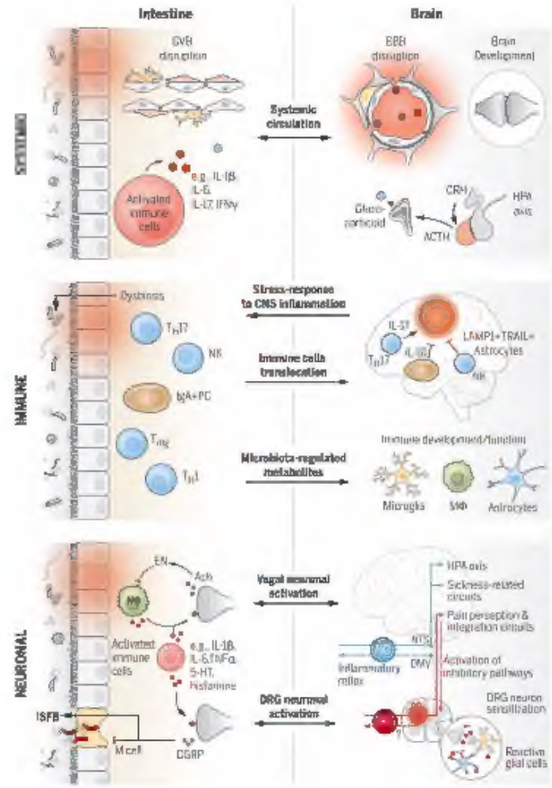


Fig. 2 Routes for signaling inflammation across the gut-brain axis.[5]

TargetMol offers various inhibitors, agonists, cytokines, and compound libraries targeting different pathways and targets related to immunity and inflammation to meet the needs of customers in various research fields. These products are widely used in innovative drug screening, inflammation model induction, drug repositioning, immune mechanism research, target validation, and organoid culture-related research fields. We provide reliable technical support and solutions for researchers.

Popular Products (Part)

Inhibitors & Agonists

Catalog No.	Product Name	Description
TQ0198	Phorbol 12-myristate 13-acetate	Phorbol 12-myristate 13-acetate (PMA), a member of the phorbol ester group of natural products, activates PKC, SphK, and NF-κB, and induces THP1 cell differentiation.
T8689	Chloroquine	Chloroquine is a Toll-like receptor inhibitor that inhibits autophagy. Chloroquine has anti-malarial and anti-inflammatory activity and is widely used in the treatment of malaria and rheumatoid arthritis.
T11855	Lipopolysaccharides	Lipopolysaccharides (LPS) derived from Escherichia coli 055:B5, are a unique component of the cell wall of Gram-negative bacteria, and highly immunogenic antigens that can enhance immune responses and can be used to construct inflammatory models.
T1076	Dexamethasone	Strong anti-inflammatory and immunosuppressive activity, used to induce muscle atrophy, hypertension, and depression models.
T1394	Ibuprofen	A propionic acid derivate and nonsteroidal anti-inflammatory drug (NSAID) with anti-inflammatory, analgesic, and antipyretic effects.
T0005	Aspirin	A COX-1 and COX-2 inhibitor, commonly used in gastric ulcer modeling and research related to coronary and cerebral vascular thrombosis
T2144	Tacrolimus	Possesses Strong T-cell immunosuppressive properties, used in organ transplant rejection and autoimmune disease research
T0945	Cyclosporin A	Immunosuppressant and immune stimulant, can induce autoimmune myocarditis (EAM), neuropathic pain, etc.
T1537	Rapamycin	Specific mTOR inhibitor and autophagy activator, used in rheumatoid arthritis and other immune-related disease research.
T1237	Azathioprine	A NF-κB inhibitor, which exhibits myelosuppression effect, induces apoptosis and reduces inflammation.
T1454	Acyclovir	Has anti-herpes virus activity, induces apoptosis, and prevents bacterial infections in acute leukemia induction therapy.
T1637	Deferoxamine Mesylate	An iron chelator and ferroptosis inhibitor, with antioxidant activity, used in diabetes, neurodegenerative diseases, and cancer research
T6202	DAPT	A γ-secretase inhibitor with neuroprotective activity, used in lymphoproliferative diseases and neurodegenerative disease research
T6964	Resiquimod	TLR7/TLR8 agonist, used in heart tissue injury model construction and systemic lupus erythematosus animal model
T0334	Rosiglitazone	PPARγ agonist, TRPC5 activator, and TRPM3 inhibitor, used in obesity, diabetes, aging, and ovarian cancer research
T1558	Resveratrol	Specific SIRT1 activator, PXR inhibitor, Nrf2 activator, used in antioxidant, anti-inflammatory, and anticancer research
T1485	Methotrexate	An inhibitor of the dihydrofolate reductase DHFR. Methotrexate has antimetabolic, antitumor, and immunosuppressive activities, and is commonly used in rheumatoid arthritis and various tumors.
T0065	Acetaminophen	A COX-2 and NAT2 inhibitor, widely used in antipyretic and analgesic research
T1642	Lenalidomide	An immunomodulator and ubiquitin E3 ligase ligand, used in multiple myeloma research
T0458	Indomethacin	A COX1 and COX2 inhibitor; A non-steroidal anti-inflammatory agent with anti-tumor and anti-infective activity

Inhibitory Antibodies

Catalog No.	Product Name	Description
T6321	Tofacitinib	A Janus kinase inhibitor that inhibits JAK3/2/1. Tofacitinib is used for the treatment of moderate to severe rheumatoid arthritis.
T9910	Rituximab	A chemical anti-CD20 monoclonal antibody and TNF-α agonist; used in rheumatoid arthritis and Crohn's disease research.
T9911	Tocilizumab	A humanized monoclonal antibody that binds to the interleukin-6 receptor, used in rheumatoid arthritis, CAR-T cell therapy, COVID-19 research
T9921	Infliximab	A Specific chimeric IgG1 monoclonal antibody against TNF-α, used in autoimmune, chronic inflammation, and diabetic neuropathy research
T78269	Anti-Mouse PD-1 Antibody (RMP1-14)	An IgG1-like immunoglobulin and anti-Mouse PD-1 antibody, used in tumor microenvironment immune checkpoint research
T9902	Atezolizumab	A fully humanized IgG1 monoclonal antibody that blocks the interaction of PD-L1 with both PD-1 and B7.1; Commonly used in cancer research.
T9901	Adalimumab	A fully human recombinant IgG1 monoclonal antibody that specifically targets human TNF-alpha; Used in rheumatoid arthritis, spondylitis, colitis, Crohn's disease research.

Cytokines

Catalog No.	Product Name	Description
TMPY-02788	IL-2 Protein, Mouse, Recombinant	Enhances the activity of immune cells (e.g., T cells, natural killer cells), used in antitumor research.
TMPY-02350	IL-12 Protein, Mouse, Recombinant (His)	Involved in cancer Th1 immune response; Used to stimulate interferon production and enhance cellular immune response.
TMPY-03238	IL-6 Protein, Mouse, Recombinant	A pro-inflammatory cytokine, used in rheumatoid arthritis and cytokine storm mechanism research.
TMPY-03356	IFN gamma Protein, Mouse, Recombinant	Inhibits viral replication; Used in antiviral, immunomodulatory and antitumor research.
TMPJ-00261	TGF beta 2 Protein, Mouse/Rat, Recombinant	An immunosuppressive factor; Used in immune tolerance, embryonic development, cell migration, proliferation and differentiation research.

Compound Libraries

Catalog No.	Library Name	Quantity	Description
L4200	FDA-Approved Drug Library	1,700+	A unique collection of 1,700+ FDA-approved drugs, ensuring safety and stability; high purity and significant efficacy, covering multiple research fields: oncology, cardiovascular drugs, anti-inflammatory, immune, nervous system drugs, respiratory system drugs, etc.

Compound Libraries

Catalog No.	Library Name	Quantity	Description
L6000	Natural Product Library for HTS	4,000+	4,000+ natural product monomers with diverse structures and strong representativeness, covering over 500 different skeleton structures and over 1000 target receptors
L6710	Anti-Inflammatory Traditional Chinese Medicine Compound Library	1,000+	1,000+ traditional Chinese medicine monomers related to inflammation, including various traditional Chinese medicines such as honeysuckle, coptis, scutellaria, notoginseng, etc.; these monomers have diverse structures such as flavonoids, saponins, terpenes, alkaloids, etc.
L4710	Nonsteroidal Anti-Inflammatory Compound Library	500+	500+ nonsteroidal anti-inflammatory related compounds, used in anti-inflammatory pharmacology research and drug development; includes common non-steroidal anti-inflammatory drug active ingredients such as aspirin, indomethacin, sulindac, ibuprofen, piroxicam, etc.
L4700	Immunology/Inflammation Compound Library	3,000+	A unique collection of 3,000+ compounds with anti-inflammatory activity, including small molecule compounds or macrolide-based drugs, typically having activities such as inhibiting immune proteases, inhibiting nuclear export proteins, inhibiting NF-kB and TNF-α
-	Anti-Inflammatory Library	28,000+	A collection of 28,000+ compounds targeting TNF, TLR7, kinases (Jak1, Itk, IRAK-4), PDE4, P2X7, NF-kB, etc.
-	Anti-inflammatory Screening Compound Library	2,900+	Over 2,900 screened compounds for anti-inflammatory drug screening and drug development research.
-	Immuno-oncology Screening Libraries	3,700+	Over 3,700 compounds related to immunotherapy, assisting research in new cancer treatment and early drug discovery.

Advantages of TargetMol's Products

Comprehensive Product Coverage
covers different targets and pathways related to immunity and inflammation.

Strict Quality Control
provides a range of quality inspection reports, such as HPLC, HNMR, LC-MS, etc.

High Safety and Stability
products have been verified by numerous literature and research.

High Cost Effectiveness
provides diverse product categories with detailed information.

Multiple Technical Services
provides virtual screening, compound screening and library customization.

Application Case 1

Li X, et al. ATM-SPARK: A GFP phase separation-based activity reporter of ATM. Sci Adv. 2023 Mar; 9(9): eade3760. IF=13.6

ATM (Ataxia Telangiectasia Mutated) is a protein kinase that plays a crucial role in the DNA damage response. Under chronic inflammatory conditions, the intracellular environment becomes unstable, leading to increased susceptibility to DNA damage. Upon DNA damage, ATM is activated and participates in processes such as DNA repair, cell cycle regulation, and apoptosis. To study the function of ATM, researchers utilized TargetMol's Immunology/Inflammation Compound Library (Catalog No.: L4700). By transfecting cells with an ATM-SPARK expression plasmid and inducing DNA damage with cisplatin, they conducted high-throughput screening and successfully identified BGT226 as a potential compound that modulates ATM activity (as shown in Figure 3).

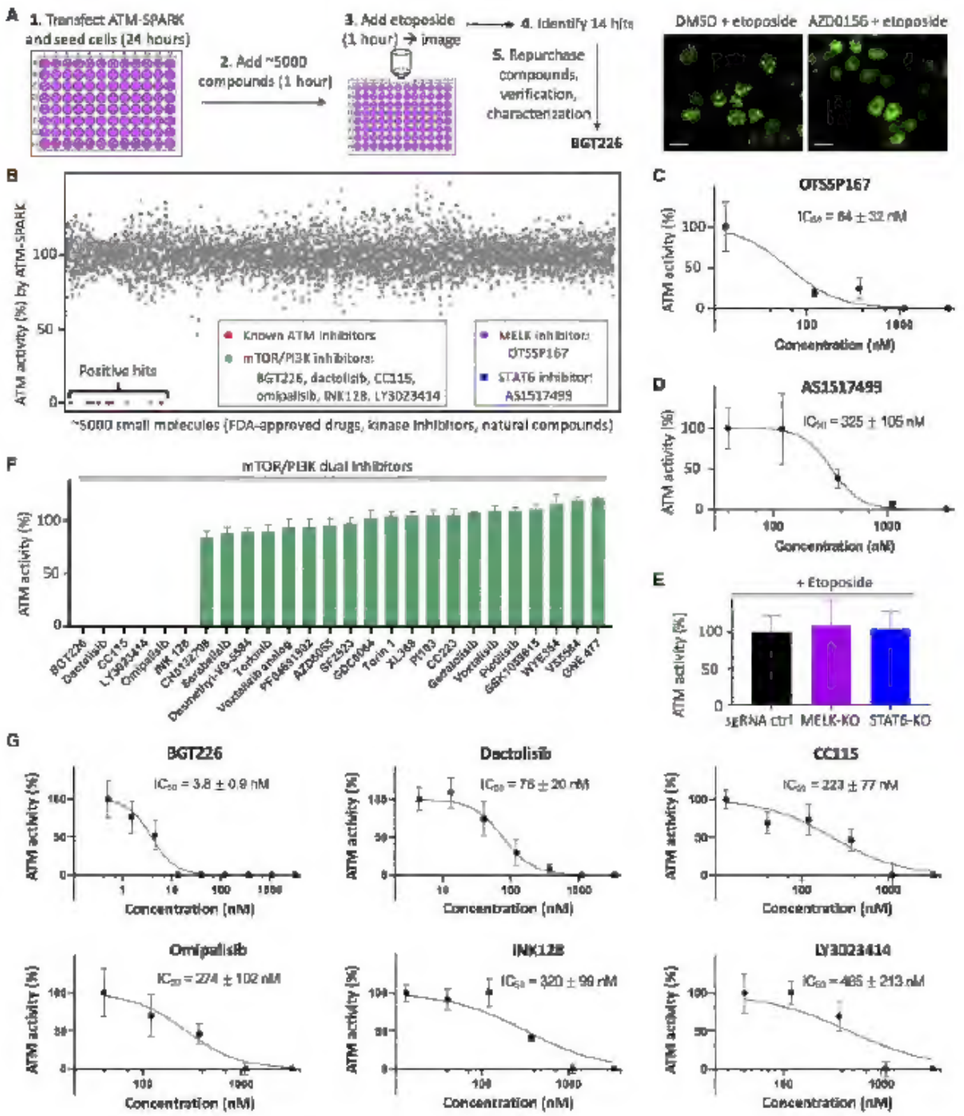


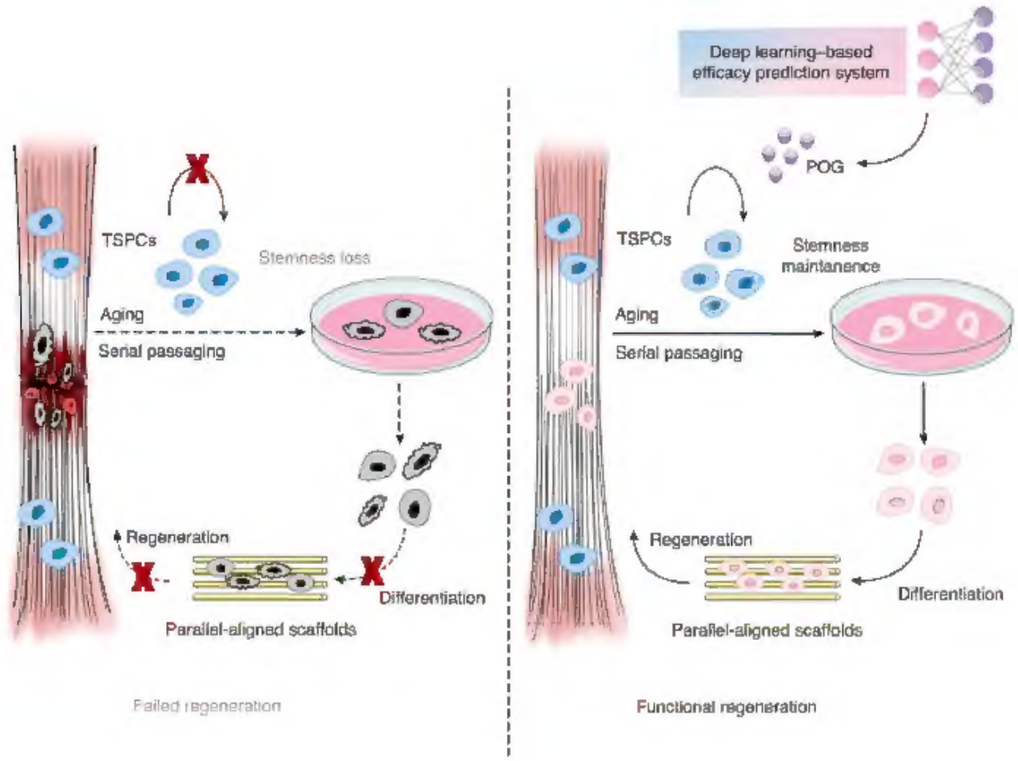
Fig. 3 High-throughput screening identifies BGT226 as a potent ATM inhibitor.

Application Case 2

Wang Y, et al. Prim-O-glucosylcimifugin ameliorates aging-impaired endogenous tendon regeneration by rejuvenating senescent tendon stem/progenitor cells. Bone Res. 2023 Oct 23; 11(1): 54. IF=12.7

Research has found that external environmental stimuli (such as inflammation) and internal changes can lead to TSPC (tendon stem/progenitor cell) aging. Maintaining stem cell potency and inhibiting stem cell aging is crucial for tissue homeostasis and regeneration.

To explore whether natural small molecule drugs could delay or reverse tendon stem cell aging and thereby enhance the regeneration and repair of aging tendons, the customer utilized the DLEPS system to screen TargetMol's FDA-approved drug library (Catalog No.: L4200) and the high-throughput screening natural product library (Catalog No.: L6000). By evaluating the impact of compounds on stem cell characteristics, POG was identified as a potential drug candidate. In the experiments, systemic or local administration of POG nanoparticles significantly improved tendon stem cell function in aged rats and promoted tendon regeneration and repair, confirming the potential of POG.



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